

PALEOBIOLOGY, PALEOECOLOGY, AND SYSTEMATICS OF SOLEMYIDAE  
(MOLLUSCA: BIVALVIA: PROTOBRANCHIA) FROM THE MAZON CREEK LAGERSTÄTTE,  
PENNSYLVANIAN OF ILLINOIS

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ABSTRACT

The most abundant bivalve of the Essex biofacies (Mazon Creek fauna, Pennsylvanian of Illinois), misidentified by past authors as the marine pholadomyoid *Edmondia* de Koninck, 1841, is herein named *Mazonomya mazonensis* n. gen., n. sp., and assigned to the family Solemyidae, based on: (1) anterior elongation of the shell as deduced from brevidorsal placement of the hinge-axis, preserved traces of the external ligament, and supporting structures; (2) preserved traces of a longidorsal extension of the ligamental outer layer and periostracum; and (3) sedimentary backfill marks left by the large foot near the longiterminus of the shell. The second most abundant Essex solemyid (*Solemya radiata* of past authors), showing traces of the periostracal frill and external ligament, is emended as *Acharax radiata* (Meek & Worthen, 1860) n. comb. Other Essex solemyids previously unreported include two probable solemyids left in open nomenclature, and *Acharax* (*Nacrosolemya*) *trapezoides* (Meek, 1874), for which Meek's original, non-Essex specimen is designated as lectotype.

Systematic revisions herein challenge open-marine and open-estuary depositional models of the Essex biofacies. Unlike coeval euhaline oxic communities in which solemyids are rare, the Essex bivalve community is dominated by solemyids, a recurrent phenomenon in carbonaceous roof-strata immediately overlying Pennsylvanian coal seams. Extant solemyids are common in shallow euryhaline waters, forming dense chemoautotrophic populations in organic-rich dysoxic/anoxic muds. Within the Essex, the prevalence of solemyids along with an admixture of thin-shelled euryhaline bivalves and growth-inhibited stenohaline bivalves is suggestive of a transitional paleoenvironment, such as a drowned coal-swamp or restricted estuary, in which superabundance of organics and nutrient pollution had induced eutrophication.

Arguably, a persistent suite of traits (amphidetic ligament, edentulous hinge, periostracal frill, mantle fusion, reduced gut, and enlarged gills hosting bacterial chemosymbionts) has characterized the Solemyidae since the Early Ordovician. Whereas the diagnostic internal ligament of *Solemya* Lamarck, 1818, is apparently a post-Paleozoic trait, the prevalence of external ligaments among Paleozoic solemyids requires that species previously placed in *Solemya* be transferred to *Acharax* Dall, 1908, or other genera. Emended examples herein are: *S. [Janeia] primaeva* Phillips, 1836, *sensu* Hind (1900) (Carboniferous, United Kingdom) is emended as *Acharax primaeva* n. comb., a probable senior synonym of *S. parallela* Beede & Rogers, 1899 (Pennsylvanian, Kansas) (non *S. parallela* Ryckholt, 1853 [1854]); *Carydium elongatum* Clarke, 1907 (Lower Devonian, New Brunswick) is emended as *Dystactella elongata* n. comb. Additionally, several European Carboniferous species of "*Solemya*" (e.g., *S. puzosiana* de Koninck, 1842, *S. saginata* Ryckholt, 1853 [1854], *S. costellata* M'Coy, 1844, and *S. excisa* de Koninck, 1885) should be reassigned to *Acharax*.